^{139}La(n,n′γ),(n,n′) 1987Ab17

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	P. K. Joshi, B. Singh, S. Singh, A. K. Jain	NDS 138, 1 (2016)	15-Oct-2016

1987Ab17: E=1.3-2.7 MeV. Measured γ′s and γ-excitation functions at 90°; tof, 0.1 MeV steps. Compared compound-nucleus calculations to γ-ray excitation functions. Only gammas which have been placed were listed by 1987Ab17.

Others:

1968Da14: E=2.9 MeV. Measured γ′s and γγ-coincidences (Ge(Li),NaI).

1969Ma05: E=2320-2580, ΔE=3. Measured σ(θ=30°−135°); tof, scin. Hauser-Feshbach.

1969Va03: E=0.5-2.3 MeV. Measured γ′s; tof. No attempt was made to observe crossover transitions between levels above 1 MeV and a threshold of 200 keV.

1978AhZX: fast reactor spectrum. Measured γ′s at 90° for 0.12 MeV≤Eγ≤3.4 MeV.

Decay scheme is based on that proposed by 1987Ab17, except as noted. Other: 1989Sc07.

^{139}La Levels

1310 level proposed by 1968Da14 not confirmed.

E(level)	Jπ†	Comments
0.0	7/2+‡	
165.86 *8*	5/2+‡	
1209.0 *4*	1/2+‡#	
1219.12 *10*	9/2+‡#	
1256.82 *13*	5/2+	
1381.30 *11*	9/2+	
1420.57@ *10*	5/2+,7/2+‡&	Jπ: 11/2+ proposed by 1987Ab17 based on excitation functions is inconsistent.
1476.45 *16*	9/2+	
1536.72a *18*	7/2+‡a	
1537.70a *10*	11/2+a	
1558.39 *15*	3/2+	
1578.03 *10*	(11/2+)&	
1683.11 *20*	9/2+&	
1716.12 *10*	9/2+&	
1761.2 *13*	3/2+	
1766.30 *25*	(5/2)+‡	Jπ: 3/2+ proposed from excitation function in (n,n′γ).
1856.4 *4*	(9/2+)	
1894.0 *5*		
1920.74 *18*	(7/2+)	
1940.85 *18*	7/2+	
1963.0 *4*	(3/2+)‡#	
2035?b *7*		
2060.9 *5*		
2161.19 *25*		

† From comparison of compound-nucleus calculations to γ-ray excitation functions, except as noted.

‡ From the Adopted Levels.

Compound-nucleus calculations consistent with adopted J^π.

@ No indication of a doublet with $J^\pi=(11/2)^-$ for a second component found by 1987Ab17. 1439 *10* level observed by 1969Ma05 may correspond to this level.

& Compound-nucleus calculations not consistent with adopted J^π.

Continued on next page (footnotes at end of table)

^{139}La(n,n′γ),(n,n′) 1987Ab17 (continued)

^{139}La Levels (continued)

[a] 1987Ab17 propose a doublet based on their comparison of compound-nucleus calculations to the 1537γ excitation function. The experimental excitation function is more than a factor of 10 larger than that calculated for 7/2+ by itself. See also footnote on 1537γ doublet.
[b] From 1969Ma05.

γ(^{139}La)

The γγ-coincidence data are from 1968Da14.
1968Da14 reported a 270.6 *10* γ which has not been observed by the other experimental groups.
1969Va03 reported 1820.0 *15* and 1835.0 *15* gammas which have not been observed by the other experimental groups.

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π
165.86	5/2+	165.85 *10*	100	0.0	7/2+
1209.0	1/2+	1043.1 *3*	100	165.86	5/2+
1219.12	9/2+	1054.2 *8*	10[@] *4*	165.86	5/2+
		1219.10[@] *10*	100[@] *13*	0.0	7/2+
1256.82	5/2+	1090.97 *10*	100 *9*	165.86	5/2+
		1256.0[h&] *10*	76 *9*	0.0	7/2+
1381.30	9/2+	1215.49[@] *10*	100[@] *11*	165.86	5/2+
		1381.1 *2*	4.8[@] *5*	0.0	7/2+
1420.57	5/2+,7/2+	1256.0[h&j] *10*	9[c]	165.86	5/2+
		1420.56 *10*	100[c]	0.0	7/2+
1476.45	9/2+	1310.64[d] *15*	100 *10*	165.86	5/2+
		1476.1 *4*	13.6 *15*	0.0	7/2+
1536.72	7/2+	1370.5[e] *2*	100[e] *4*	165.86	5/2+
		1537.3[he] *10*	100[e] *4*	0.0	7/2+
1537.70	11/2+	1537.69[h] *10*	100	0.0	7/2+
1558.39	3/2+	1392.4 *2*	74 *7*	165.86	5/2+
		1558.5 *2*	100 *10*	0.0	7/2+
1578.03	(11/2+)	1578.09 *10*	100[c]	0.0	7/2+
1683.11	9/2+	1520.0[cj] *20*	4[c]	165.86	5/2+
		1683.1 *2*	100 *12*	0.0	7/2+
1716.12	9/2+	1716.11 *10*	100[c]	0.0	7/2+
1761.2	3/2+	1595.3[a] *13*	100[a]	165.86	5/2+
1766.30	(5/2)+	291.3[fj] *2*	56[cf]	1476.45	9/2+
		1600.9 *6*	100 *20*	165.86	5/2+
		1766.0[bj] *4*	100 *12*	0.0	7/2+
1856.4	(9/2+)	1690.5 *3*	100	165.86	5/2+
1894.0		1894.0[ibj] *5*	100[i]	0.0	7/2+
1920.74	(7/2+)	1755.0[g] *4*	83 *10*	165.86	5/2+
		1920.7 *2*	100 *12*	0.0	7/2+
1940.85	7/2+	174.6[f] *2*	100[a]	1766.30	(5/2)+
		363.1[f] *2*	69[af]	1578.03	(11/2+)
		403.8[f] *2*	87[af]	1536.72	7/2+
1963.0	(3/2+)	1797.1 *4*	100	165.86	5/2+
2060.9		1894.0[ibj] *5*	71[i] *9*	165.86	5/2+
		2060.9 *5*	100 *12*	0.0	7/2+
2161.19		308.3[fj] *3*	100 *14*	1856.4	(9/2+)
		477.0[aj] *9*		1683.11	9/2+
		581.3[fj] *5*	66 *19*	1578.03	(11/2+)

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^{139}La(n,n′γ),(n,n′) 1987Ab17 (continued)

γ(^{139}La) (continued)

† Relative photon branching ratios from each level (from 1978AhZX, except as noted).
‡ 1987Ab17 assigned a 329.6γ [Iγ(329.6γ)/Iγ(1537)=24/52] to 1537, 7/2$^+$; however, this would imply an M3 transition which is not consistent with RUL.
# Assignment of 424.8 *7* γ to 1683 and 1852.7 *13* γ to 1856 by 1987Ab17 not consistent with β^- decay; Iγ(424.8γ)/Iγ(1683γ)=0.25 (1987Ab17) and Iγ(425γ)/Iγ(1683γ)=0.57 *11* (1978AhZX) and Iγ(1852.7γ)/Iγ(1690.1γ)=2.5 and Iγ(1853.64γ)/Iγ(1690.5)=2.1 *4* (1987Ab17). Also, Eγ′s differ from results of least-squares analysis by more than 5σ.
@ 1987Ab17 observed a 1218.8 *15* doublet and used the branching Iγ(1053γ)/Iγ(1219γ)=10/90 and Iγ(1219γ)/Iγ(1381γ)=95/5 from other work to resolve the doublet..
& 1987Ab17 see no evidence for the multiple placement of the 1256γ and place it as completely deexciting the 1256 level.
a From 1987Ab17. Iγ renormalized by evaluators from percent branching ratios to branching ratios normalized by evaluators to 100 for strongest transition.
b Not placed by 1987Ab17.
c From 1968Da14.
d Alternate placement as deexciting 1310 level suggested by 1978AhZX and 1968Da14 not confirmed by 1987Ab17.
e Eγ=1537.69 *10* (1978AhZX) differs significantly from 1536.11 *22* based on least-squares analysis. This suggests that in work of 1978AhZX the 1538, 11/2$^+$, level is preferentially populated while in the work of 1987Ab17 there is more of an equal population (Eγ=1537.3 *10*). Iγ from Coul. ex.; 1987Ab17 obtained Iγ(329.6γ):Iγ(1370γ):Iγ(1537γ)=24:24:52; however, the decomposition of the intensity of the 1537 doublet depended on the assumption that the 329.6γ deexcites the 1537, 7/2$^+$ level.
f Unplaced by 1978AhZX. Iγ(291γ)/Iγ(1716γ)=0.45 *7*, Iγ(291γ)/Iγ(1601γ)=1.6 *4*, Iγ(363γ)/Iγ(175γ)=0.45 *12*, Iγ(404γ)/Iγ(175γ)=0.49 *14* (1978AhZX). Placement of 291.3γ at 1716 is from 1968Da14. The energy of 291.3 *2* is discrepant with results from least-squares analysis by more than 5 σ.
g Alternative placement from 1756 level (1969Va03) not confirmed.
h Multiply placed.
i Multiply placed with undivided intensity.
j Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

Legend

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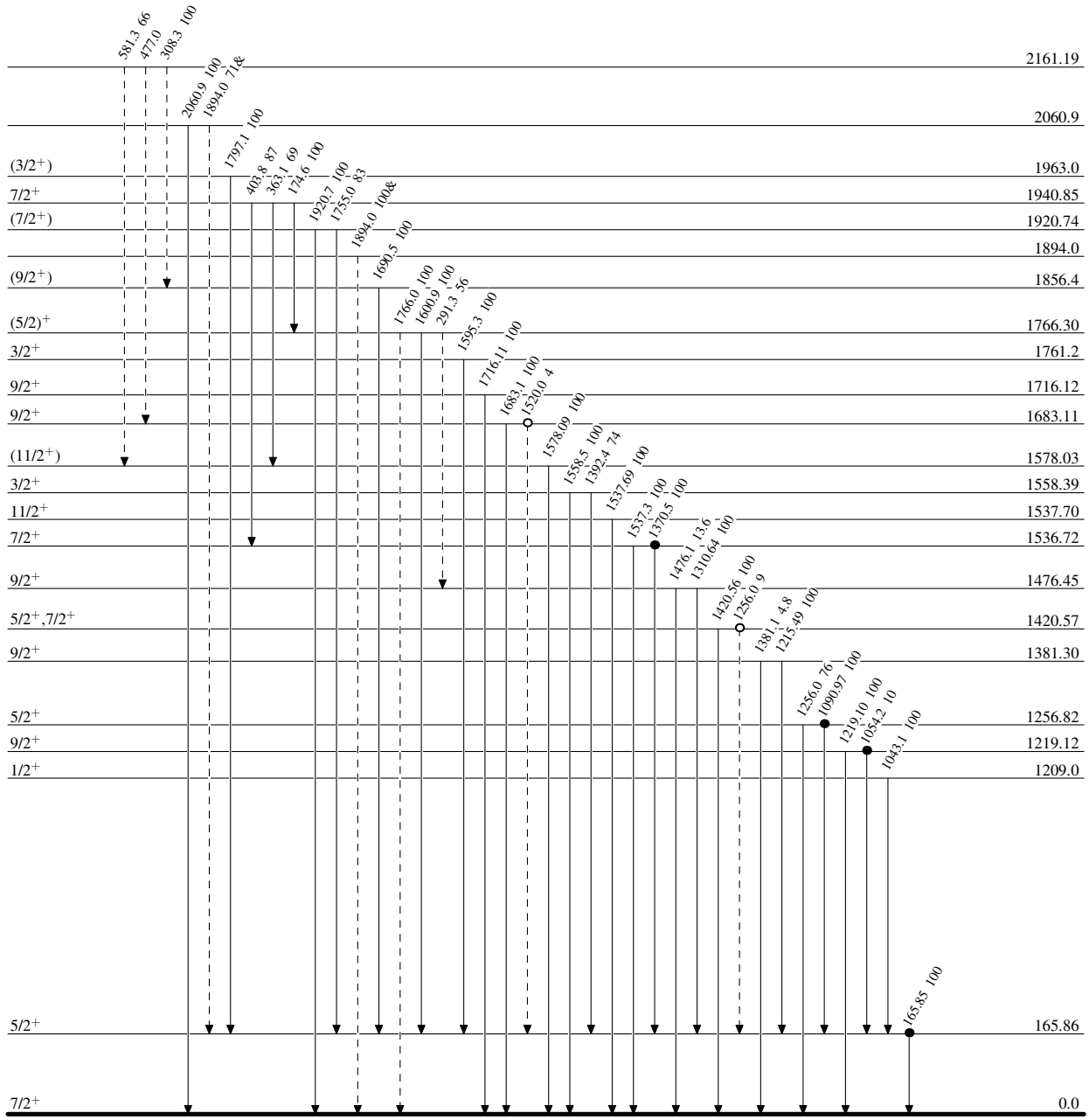
Level Scheme

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

- - - - - - ► γ Decay (Uncertain)
● Coincidence
○ Coincidence (Uncertain)



$^{139}_{57}La_{82}$